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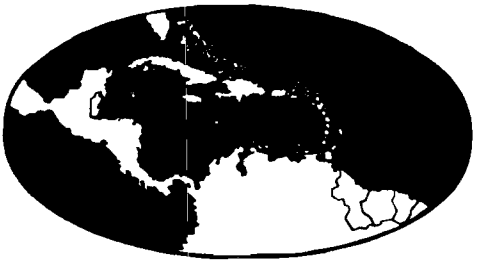
CARIBBEAN FOOD CROPS SOCIETY



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SOME OBSERVATIONS ON THE REACTION OF THE BODIE BEAN (*VIGNA UNGUICULATA*) VARIETY LOS BANOS BUSH SITAO 1 TO COWPEA MOSAIC VIRUS

SYED Q. HAQUE* and PATTANJALI DIAL†
*Virologist, Caribbean Agricultural Research and Development Institute, St. Augustine, Trinidad.
†Pathologist, Ministry of Agriculture, Mon Repos, Guyana.

SUMMARY

The Los Banos Bush Sitao 1, a variety of bodie bean derived from a cross of a bushy cowpea (California Blackeye) and a viny bodie (Singapore), has been recently introduced into the Caribbean. On account of its several desirable qualities including early maturity, good pod quality and high yielding, this variety is in great demand. No information is available on the reaction of this new variety to cowpea mosaic virus which is an important and widespread disease of *Vigna unguiculata* in the region. Experiments were therefore conducted to observe the reaction of this bodie variety to the Trinidad isolate of cowpea mosaic virus. The results showed that 100 percent of the plants inoculated with cowpea mosaic virus were infected. Further, plants of different ages from 10 - 40 days were equally susceptible to the virus. Cowpea mosaic virus was also found to be seed-borne in Los Banos Bush Sitao 1. The level of seed-borne infection in the present case was, however, low since only 7 out of 631 seeds tested showed the infection.

INTRODUCTION

The beetle-transmitted cowpea mosaic virus (Dale, 1949; 1953) is an important and widespread disease of *Vigna* spp. It is known to occur in Nigeria (Chant, 1959), Suriname (Van Hoof, 1963) and the United States of America (Smith, 1924). Cowpea mosaic virus is an important disease of blackeye cowpea in Trinidad besides several other islands in the Commonwealth Caribbean (Phelps and Haque, 1973). Under Trinidad conditions, the virus is known to be transmitted by the beetle *Ceratoma ruficornis* (Oliv) which is also an important pest of cowpea (Dale, 1949). Dale (1953) reported the virus to be sap transmissible and seed-borne in *Vigna unguiculata* and this was recently confirmed by Haque and Persad (1974). The virus has a wide host range which includes several species of the family leguminosae besides others.

Los Banos Bush Sitao 1, a variety of dwarf bodie (*Vigna unguiculata*) from the University of the Philippines has been introduced recently in Trinidad and other islands of the Commonwealth Caribbean by Ferguson (1973). This variety is a cross between a bushy cowpea (California Blackeye) and a viny bodie (Singapore) (Acosta and Petrache, 1960; Floresca *et al.*, 1960). This variety is in great demand in the region on account of its several desirable features (Ferguson, 1974). It could be grown all the year round. The pods are of medium size and are easily harvested by being borne on erect peduncles and held above the plants. The fruits are eaten either in the immature snap stage or can be consumed as ripe mature dry beans. No information is available regarding the reaction of this variety to cowpea mosaic virus. Particularly since the Trinidad strain of cowpea mosaic virus is regarded as a severe strain (Agrawal, 1964), the present studies were undertaken to find out the reaction of Los Banos Bush Sitao 1 to the Trinidad strain of cowpea mosaic virus. In view of the importance of seed-borne infection in the spread of a virus in a given area and as a means of transport of the virus from one area to another, it was planned to find out if cowpea mosaic virus was seed-borne in this variety. The results of these studies are presented in this paper.

MATERIALS AND METHODS

The cowpea mosaic virus used in these experiments was obtained from the culture maintained by the first author. Except otherwise mentioned, all experiments were conducted inside an insect-protected glasshouse. All inoculations were done on the youngest trifoliate leaves using sap from infected leaves of cowpea with the help of 600 mesh Carborundum powder.

EXPERIMENTAL

Two experiments were designed to observe possible sap and seed transmission of the cowpea mosaic virus in bodie variety Los Banos Bush Sitao 1.

1. Reaction of the Los Banos Bush Sitao 1 to the Trinidad isolate of the Cowpea Mosaic Virus

This experiment was designed to observe the reaction of the bodie variety Los Banos Bush Sitao 1 to the Trinidad isolate of the cowpea mosaic virus.

Fifty Bush Sitao 1 plants were grown in pots in sterilized soil. At the first trifoliate leaf stage ten plants were inoculated with cowpea mosaic virus using the method described earlier. Similar inoculations were made on three other batches of ten plants each at 10 day intervals. In these latter cases the youngest trifoliate leaf was inoculated with the cowpea mosaic virus. The last batch of 10 plants was left uninoculated and served as control.

TABLE 1. Reaction of bodie variety Los Banos Bush Sitao 1 plants of different ages to the cowpea mosaic virus.

Days after germination	No. of Plants inoculated	No. of Plants showing symptoms
10	10	10
20	10	10
30	10	10
40	10	10
Uninoculated control -	ten plants	None

The results presented in Table 1 show that irrespective of the age of the plants 100 percent of the Los Banos Bush Sitao 1 plants inoculated with cowpea mosaic virus were infected. None of the ten uninoculated plants showed any symptom. There was no marked difference in the pattern of symptom on plants of different ages. Symptoms on inoculated leaves consisted of chlorotic and necrotic spots besides blistering and mosaic on leaf lamina. The subsequent leaves showed vein clearing, leaf distortion and occasional veinal necrosis besides mosaic symptoms. Necrosis of the stem was observed in some cases.

2. Possible seed transmission of cowpea mosaic virus in the Los Banos Bush Sitao 1

Experiments were conducted to observe if cowpea mosaic virus was transmissible through the seeds of bodie bean variety, Los Banos Bush Sitao 1. For this prupose seeds of Los Banos Bush Sitao 1 were sown in field at the University Field Station. A total of 150 seeds germinated. These were allowed to grow to a stage when all the plants had formed at least the first trifoliate leaves. The plants were observed at this stage and all the plants were found to be free of any virus symptom. At this stage the youngest leaves of all the plants were inoculated with cowpea mosaic virus using sap inoculation with carborundum. Within 10 days of inoculation all the plants showed symptoms of cowpea mosaic virus. These plants were allowed to grow in the field and form pods. Mature pods were finally harvested and the seeds were collected for testing in the glasshouse. These seeds were sown in fibre-glass flats filled with sterilized soil inside the glasshouse. A total of 631 seeds germinated. The growing plants were observed for virus symptoms on the cotylendonary leaves and the first trifoliate leaves. A total of 7 plants showed symptoms which consisted of mosaic, vein clearing and distor-

tion of the leaves. The identity of the virus on these plants was confirmed as cowpea mosaic virus. These results show that cowpea mosaic virus is transmissible through the seeds of bodie bean variety Los Banos Bush Sitao 1.

DISCUSSION

In experiments involving sap inoculation of the Trinidad isolate of cowpea mosaic virus, it was observed that 100 percent of inoculated plants showed symptoms. It was further observed that plants of different ages ranging from 10 to 40 days were equally susceptible to the virus. The symptoms produced on these plants were of severe type and resembled those described by Agrawal (1964) for the severe strain of cowpea mosaic virus. In another experiment designed to test the transmissibility of cowpea mosaic virus through the seeds of Los Banos Bush Sitao 1, it was observed that the virus was seed transmissible, although the proportion of seed-borne infection was low (7 infected out of 631 seeds tested) in the present case. These findings show that the bodie bean variety Los Banos Bush Sitao 1 is highly susceptible to cowpea mosaic virus and carried seed-borne infection of the virus.

The present findings that Los Banos Bush Sitao 1 is highly susceptible to cowpea mosaic virus assumes special significance in view of the observations that the beetle *Ceratoma ruficornis* is an efficient vector of the disease (Dale, 1953) and the Trinidad strain of cowpea mosaic virus is a severe strain (Agrawal, 1964). There is, therefore, a need to work out an efficient system to appreciably reduce the possible adverse effects of cowpea mosaic virus on the production of bodie bean variety Los Banos Bush Sitao 1.

The implications of the seed-borne infection of cowpea mosaic virus to Los Banos Bush Sitao 1 are noteworthy. The few infected plants coming out of the diseased seeds would serve as initial sources of infection in any given planting and with the efficient beetle vector around as an important pest there is every likelihood of high incidence of the disease. Further, since the seeds of this variety are being distributed to different islands in the region, there are chances that each lot of the seed may not only carry a built-in inoculum of cowpea mosaic virus but may introduce the severe strain of the virus in a new area. The importance of the production of virus-free seed, therefore, need not be over-emphasized.

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